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AUTHOR Criswell, Larry W.
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ABSTRACT

Further analysis of data previously discussed in a journal article ("Episodic Instability in School District Elections," by L. Criswell and D. Mitchell, in the July, 1980 issue of "Urban Education") indicates that the success of a school board candidate in defeating an incumbent increases the probability that other school board members originally elected at the same time as that defeated incumbent will be defeated in coming elections, while the likelihood is decreased that members elected at the same time as the successful insurgent will be defeated in coming elections. This conclusion was reached by subjecting election results from 89 school districts in four Southern California counties from 1956 to 1977 to two- and three-way analyses of variance, to regression analysis, and to analysis of covariance. (PGD)

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APPLYING THE EPISODIC THEORY TO SCHOOL BOARD COHORTS

BY

LARRY W. CRISWELL

Department of Sociology, Social Work,
Anthropology and Criminal Justice

CHAPMAN COLLEGE

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I. Introduction

The possibility that elections provide democratic control over governmental agencies only through irregular and dramatic realignments among voting groups has received significant attention among political scientists.[1] In the study of local school districts, this notion of episodic political change through critical elections was first articulated by Iannaccone and Lutz,[2] who linked incumbent school board member defeat at the polls with the dismissal of a school district's chief executive. The central hypotheses in this strand of research were originally formulated largely on the basis of intensive investigation of a single school district. In the ensuing decade a number of efforts[3] were made to test these hypotheses using statistical data from several different states and covering various historical periods.

It is important to recognize that research based on the Iannaccone/Lutz[4] model has not considered all aspects of critical elections theory. Three major assertions tend to be embodied in the critical elections theory.[5] The first of these assertions is that community values do change and flow through a school board. The second assertion is that these value shifts are presented in the form of policy mandates for change or no change. The final assertion to be noted is that an episode is made up of the presence of periods of quiescence and periods of intense instability for which these two can be distinguished. It was the Thorsted[6] data which made an early attempt to get at this notion of critical elections . In his data, he was successful in revealing that over short periods of time incumbent defeats

tend to occur repeatedly in some districts and not at all in others.

An attempt was made by the Criswell[7] study and the subsequent Criswell and Mitchell[8] article to view whether or not the process of school board incumbent defeats is appropriately described as an episodic and predictable process rather than a random process. The findings reported in the Criswell and Mitchell article suggest that school board defeats and victories vary in frequency from district to district, but are cyclic, that is, patterned over time. It is the purpose of the study reported here to examine one of the intriguing possibilities found in the Criswell/Mitchell data not earlier reported. That being, namely, the probability of any member of a cohort suffering on incumbent defeat is affected by whether or not a member of that same cohort group defeated an incumbent in a prior election. Since the study being reported here is generated from the Criswell/Mitchell study data it is necessary to return to that article and present a brief reprisal of its methodology and findings.

II. Reprisal of Criswell/Mitchell Article[10]

A. Statement of Problem and Methodology

Following the Iannaccone/Lutz model a working hypothesis was formulated which attempted to distinguish between an initial incumbent defeat after a period of quiescence and the existence of continued electoral instability. Election data from 89 school districts in four Southern California Counties from 1956 to 1977 was collected for the sample. The districts selected fit four criteria:

1) Five member board
2) conducted elections from 1956 to 1977,
3) elected board members at-large, and

4) none which had undergone unification or annexations during the time under investigation.

Table 2 displays the distribution of the 89 sample school districts by county and by type of school district organization which was selected from the population of districts by County (Table 1).

The chi-square [11] for type of districts indicates a maldistribution between types of school districts with a disproportionate clustering in the elementary school district. The maldistribution was due to too many elementary school districts with not enough unified school districts to fit the population profile (Table 1). The major cause for this underrepresentation is due to the period of analysis which was selected since many of the unified districts underwent unification/annexation during this time frame. The distribution between counties appears to be a normal distribution. There appears to be no serious problems in the sample.

TABLE 1

THE POPULATION OF DISTRICTS BY COUNTY

AND BY TYPE OF DISTRICTS

	Elementary N (%)	Secondary	Unified	Four County Total
Los Angeles	29 (28%)	6 (6%)	15 (15%)	50 (49%)
Orange	14 (14%)	3 (3%)	2 (2%)	19 (18%)
Riverside	5 (5%)	1 (1%)	11 (11%)	17 (17%)
San Bernardino	11 (11%)	1 (1%)	5 (5%)	17 (17%)
Total*	59 (57%)	11 (11%)	33 (32%)	103

* Percentages may not total to 100% due to round-off.

TABLE 2

NUMBER OF DISTRICTS BY COUNTY AND

BY TYPE OF DISTRICT IN THE SAMPLE

County	Elementary	Secondary	Unified	Total
Los Angeles	28 (32%)	6 (7%)	13 (15%)	47 (53%)
Orange	10 (11%)	3 (3%)	2 (2%)	15 (17%)
Riverside	4 (5%)	1 (1%)	6 (7%)	11 (125)
San Bernardino	11 (12%)	1 (1%)	4 (5%)	16 (18%)
Total*	53 (60%)	11 (12%)	25 (28%)	89

*Totals may not total 100% due to round-off.

The goodness of fit chi square by county is .752, df = 3, p < NS.

The goodness of fit chi square by type of district is 10.6, df = 2, p < .01.

B. Data Analysis

Fairly complex procedures for analysis of the data were utilized in order to control for possible effects of difference in district susceptibility to political instability and in order to eliminate the effects of variation in the total rate of incumbent defeat over the 20-year period under study.

The first step taken was to determine whether the district differences found by Minar [12] recur as a significant factor in the data. This was done by use of a two-way analysis of variance (ANOVA).

The data matrix for the two-way ANOVA problem consists of 89

districts by the 10 elections held between 1959 and 1977. A single entry in each cell records the outcome of each election for that district. The outcome score is 0.0 if there was no incumbent defeat and 1.0 if there was an incumbent defeat. Results of this analysis are discussed in relation to Table 4. A Cochran's Q test was utilized to verify the robustness of the F statistic in this analysis.[13]

TABLE 3

Scoring of a Sample District

Years:	'57	'59	'61	'63	'65	'67	'69	'71	'73	'75	'77
Number of Elections Held	1	2	1	1	1	1	1	1	1	1	1
Outcomes	1.0	1.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0

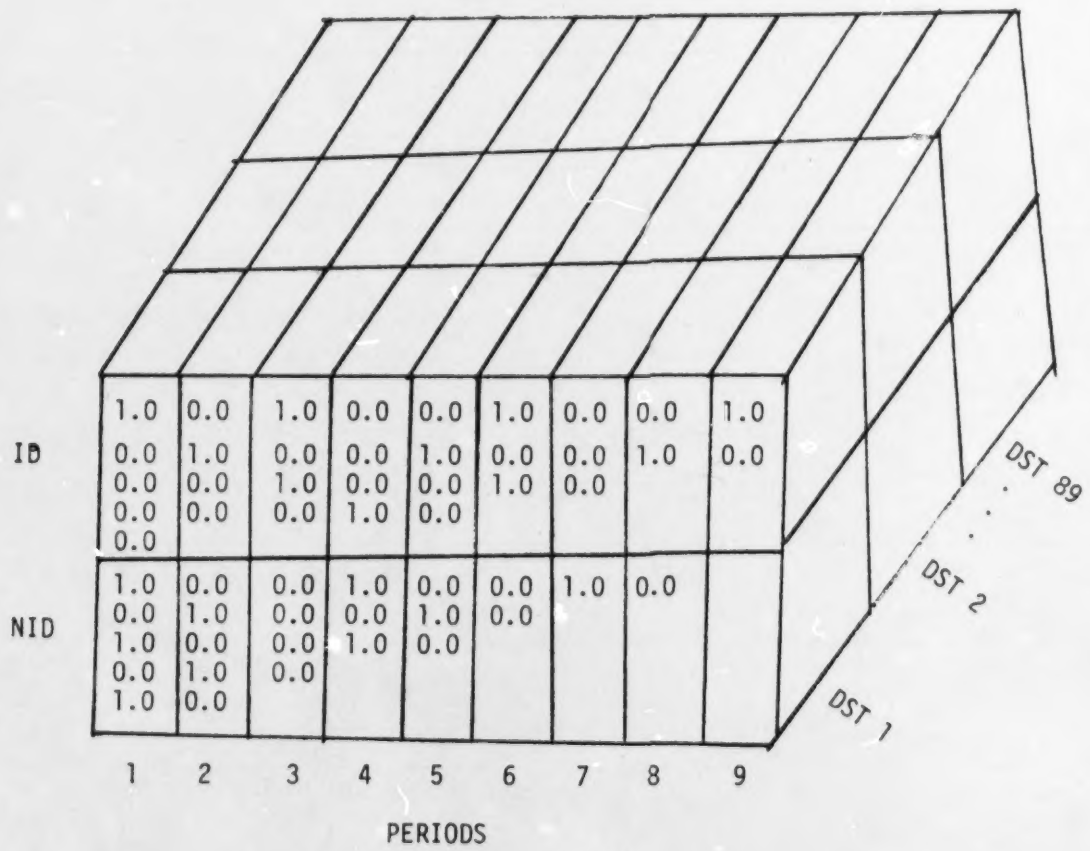
In order to investigate whether the defeat of an incumbent school board member in one election is significantly related to outcomes in previous elections, a three-way analysis of variance was utilized. Once the three-way ANOVA demonstrated that the rates of incumbent defeat are significantly affected by prior election results, regression analysis was used to describe more precisely the nature and extent of the relationship. Transformation of the original data (illustrated in Table 3) was required for the application of the three-way analysis of variance.[14] The election outcome in an initial election was treated as Factor A (defining the rows of the three-way ANOVA). This factor consists of two levels, incumbent defeat (ID) and nonincumbent defeat (NID). Election periods following each initial election define the levels of Factor B (the columns of the three-way ANOVA table). This factor

consists of up to nine election periods following any election. Factor C separates the districts samples, providing one level for each district in the sample. Factor C, therefore, has 89 levels. Figure 1 depicts the arrangement of the array (2 x 9 x 89) of data cells for this study and indicates how the data for the sample district shown in Table 3 were entered into the three-way ANOVA data array.

In each cell, C_{ijk} (where i - initial outcome, j = election period, and k = district) is recorded for the outcome of all elections within district k which occurred in the j^{th} period following the initial election. Results entered into either the incumbent defeat row (i.e., i = 1) or the nonincumbent defeat row (i.e., i = 2) of the array depending on the outcome of the initial election. As shown in Table 3 the outcome of the first election was an incumbent defeat as shown by a 1.0 under the year 1957. Accordingly, in Figure 1 outcomes for elections from 1959 to 1975 were recorded in the incumbent defeat row (row 1). A score of 1.0 and a second score of 0.0 are entered into cell 1 because the first outcome following the 1957 incumbent defeat included one incumbent defeat and one nonincumbent defeat election in 1958-1959 two-year period. The observations in all subsequent years were then recorded in the remaining eight columns as shown in Figure 1. This process was repeated using the outcome of the 1959 election period as the initial election. Since the observation for 1959 was incumbent defeat (1.0), the outcomes for all elections following 1959, as shown in Table 3, were recorded in the incumbent defeat row (row 1). When the outcome of an initial election was a nonincumbent defeat (0.0) as was the case in 1961, the tallying was recorded in the NID row (i.e., row 2) of Figure 1. This data recording process continued until each election (up through 1975) had been utilized as an "initial election" and the outcomes of all subsequent

FIGURE 1

THE RESEARCH DESIGN (2 x 9 x 89)



elections were recorded in the proper cells.

The resulting analysis of variance table was, of course, completely unbalanced. It does, however, meet the requirements for an unbiased test for significant effects of each of our three factors. As discussed above, prior research by Minar leads us to expect the 89 districts (Factor C) to produce a significant effect reflecting the fact that some districts have more political instability than others. We did not, of course, expect to be able to reject the null hypothesis for differences between initial outcomes or election periods since the outcomes of all elections are repeatedly entered into the data analysis over the various election periods. We did, however, expect to reject the null hypothesis in a test of the interaction effects between initial election outcomes (Factor A) and subsequent election periods (Factor B). This exception reflected the hypothesis that an incumbent defeat during an initial election alters the timing of incumbent defeats during subsequent elections.

The mean scores in each cell of Figure 1 indicate the proportion of elections in that cell resulting in an incumbent defeat. Hence, if the outcome of one election affects the timing or the probability of incumbent defeats occurring in the same school district at later election periods, the pattern of mean scores for cells in the first row (i.e., those following an incumbent defeat) will be significantly different from the pattern of mean scores for cells in the second row (i.e., those following elections which did not result in an incumbent defeat). Specifically, the hypothesis that defeats are clustered together in relatively brief episodes of political instability leads to the expectation that the mean scores in the first row will be higher during the early periods and will become equal to, or lower than, those of the second row during later elections more remote in time from the initial

election on the basis of which data is entered into row 1 or row 2 of the data table.

In order to create an unbiased test for the existence of significant differences between the means of the various cells, it must be kept in mind that we are dealing with a mixed effects design. The outcome factor (Factor A) and the period factor (Factor B) are fixed factors. However, the districts selected for this sample (Factor C) are merely a random sampling from the population of all districts and, therefore, must be treated as a random factor.

Given the mixed effects design, the error term for testing effects involving factors A and B alone or together (i.e., A, B, and A X B was tested against the appropriate interaction terms containing Factor C (i.e., A X C, B X C, and A X B X C respectively), while the remaining sources of variance in the table (i.e., C, A X B X C and A X B X C are all tested against the within-group mean square.[15]

Once the analysis of variance had demonstrated that the rate of incumbent defeat was indeed, significantly affected by prior election results, regression analysis assists in describing more precisely the changes in the rate of incumbent defeat from one election period to another.

C. Findings

The "Minar effect" was investigated by means of the two-way ANOVA presented in Table 4. Three conclusions were supported. First, there is a significant district effect ($p<.01$) indicating that some districts within the sample do have significantly higher rates of incumbent school board member defeat than others. This finding reconfirms Minar's [16] earlier work.

Second, it was noted that only 14% of the total variance in election

outcomes is due to this tendency for some districts to have more defeats than others. Thus, 86% of the variance is randomly distributed among districts--leaving a great deal to be explained by other factors.

The third conclusion supported by the two-way ANOVA was that there exist significant differents ($p<.001$) in the rate of incumbent defeats from one election period to another. Thus statistical control for these variations in the rate of incumbent defeat at different time periods is required in order to determine whether the outcome of one election affects outcomes in later elections independently from the historical vicissitudes of overall rates of incumbent defeats. The anticipation of this finding led to the use of the complex three-way ANOVA design described above.

TABLE 4

Two-Way Analysis of Variance on the Association Between Incumbent Defeats (factors are districts and election periods)

Source	Sum of Squares	df	Mean Sq.	F	P
Districts	26.287	88	.2987	1.49	<.01
Election Periods	5.709	9	.6343	3.16	<.001
District x Election Periods	158.791	792	.2005		
TOTAL	190.788	889			

Table 5 presents the results from the three-way ANOVA. Two major findings was implied in the results of this ANOVA. First, we note that there were no significant interaction effects involving the districts and either of the other two factors. There was, however, a highly significant district effect which reconfirms the finding in our two-way ANOVA supporting Minar's

(1966) work. This finding not only indicates that Minar was right in asserting that conflict tends to be focused in some districts but it also demonstrates that the higher rates of incumbent defeats in some districts do not confound the effects of either the election period or the initial outcome factors. That is, the higher rates of incumbent school board member defeat within certain districts do not significantly affect the tendency of those defeats to be clustered into relatively brief episodes of political instability. Thus two questions regarding Minar's work was settled. First, the data show, despite the fact that some districts have more defeats than others, a district's defeat pattern is not dependent upon the total number of defeats occurring. Second, although it is true that some districts do have more incumbent defeats than do others, this larger number of defeats does not involve an endless chain of instability which has no end. The more frequent defeats in some districts appear to reflect simply greater inclination toward political activism or reduced capacity for conflict management in some districts--not a basically different relationship between voter dissatisfaction and political instability.

Although the initial outcome factor appears to have an even stronger effect than the district factor, there was a highly significant ($p<.001$) interaction effect between outcome and election period. Thus the second pattern of school board election outcomes following a nonincumbent defeat election is significantly different from that following an incumbent defeat election. Thus, it was necessary to disaggregate the data according to the outcome of the initial election in order to compare the pattern of incumbent defeats following each of the two types of initial outcomes. This is what we had predicted and represents the effect of primary interest in this entire study. The question at hand becomes: What can be learned about the nature

of this interaction effect? Regression analysis was utilized in the interpretation of this problem.

TABLE 5

Three-Way Analysis of Variance on the Association Between Incumbent Defeats (factors are periods, outcomes, and districts)

Sources	Sum of Squares	dF	Mean Sq.	F	P
Districts	170.4045	88	1.9364	9.338	<.001
Outcomes	1.1350	1	1.1350	18.369	<.001
Periods	1.0505	8	.1313	1.769	NS
Districts x Outcomes	5.4375	88	.0618	.298	NS
Districts x Periods	52.2556	704	.0742	.358	NS
Outcomes x Periods	8.1963	8	1.0245	7.390	<.001
Districts x Outcomes x Periods	97.6007	704	.1386	.669	NS
Within Cells	671.2452	3236	.2074		
TOTAL	1007.3252	4837			

Table 6 provides a look at the calculated mean scores in each of the Outcome X Election Period subtotals. These mean scores indicate what proportion of elections in each election period involved an incumbent school board member defeat. Thus, if the defeat of an incumbent affects the probability of further incumbent defeats in the same school district at later election periods, the mean scores in the first row of the figure (i.e., those following an incumbent defeat) will be significantly different from the mean scores

in the second row (i.e., those following an election which does not result in an incumbent defeat. Figure 2 presents in graphic form the mean scores from Table 6.

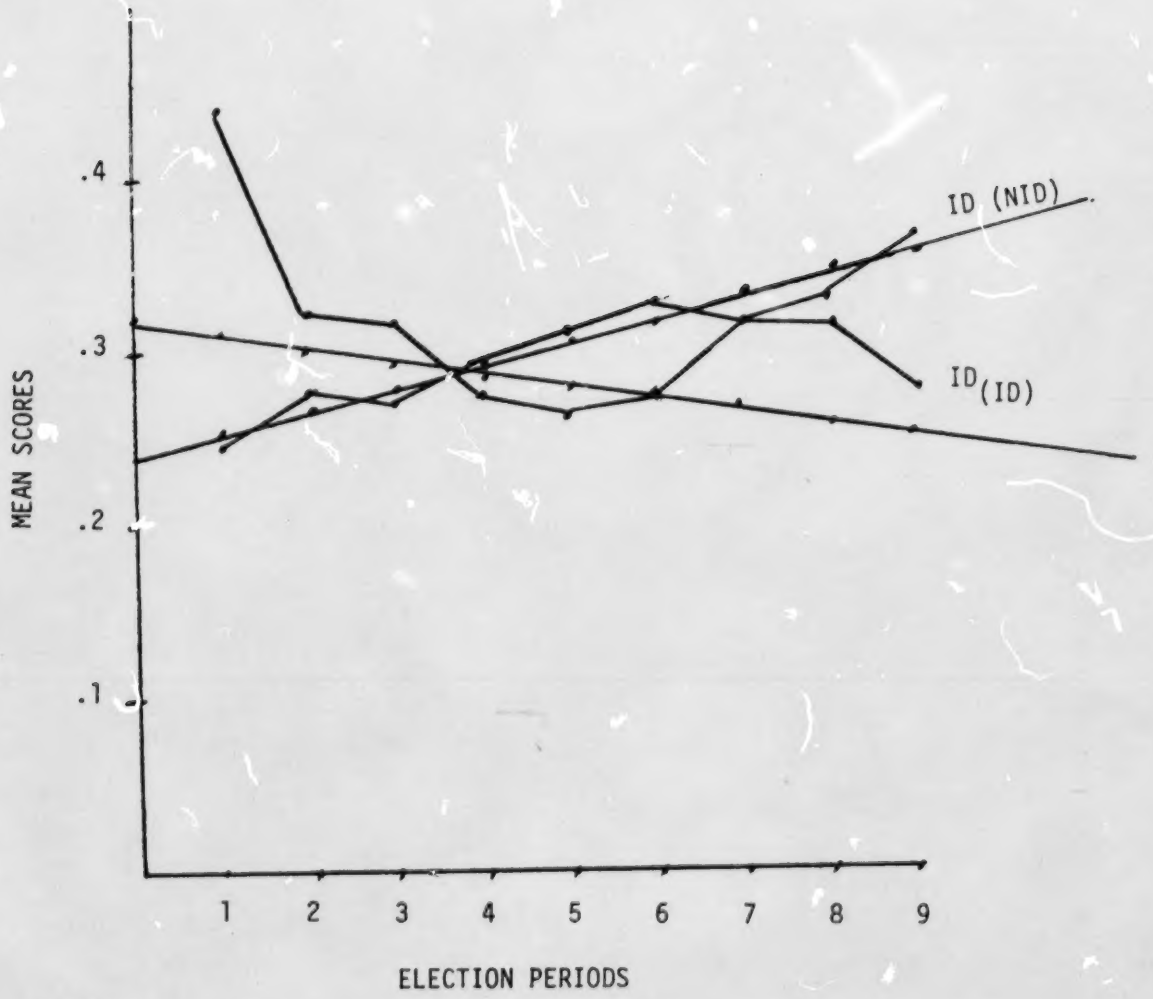
TABLE 6

Mean and Standard Deviation Scores for the Incumbent Defeat and the No Incumbent Defeat Groups in Each of the Nine Periods

Election Periods		S^1	S^2	S^3	S^4	S^5	S^6	S^7	S^8	S^9
Following ID:	N_{ID} =	259	229	202	177	152	132	115	88	59
	$\bar{X}_{ID}$	.440	.323	.322	.266	.257	.265	.313	.307	.271
	$(s.d._{ID})$	(.497)	(.469)	(.468)	(.443)	(.438)	(.443)	(.466)	(.454)	(.448)
Following Non ID:	N_{NID} =	625	566	504	440	376	307	235	173	113
	$\bar{X}_{NID}$	.245	.270	.270	.291	.314	.326	.319	.320	.361
	$(s.d._{NID})$	(.430)	(.445)	(.444)	(.455)	(.465)	(.469)	(.467)	(.471)	(.483)

FIGURE 2

Proportion of School Districts Suffering
Incumbent Defeat in Successive Elections



The findings reported from the regression analysis indicated that the outcome of one election has a significant effect on the outcome of both immediately following elections and those occurring some years later. It was concluded by Criswell/Mitchell that the Iannaccone/Lutz theory (of democratic control of school district policy through episodic upheavels of voter dissatisfaction leading to incumbent defeat and then to changes in school administration) not only withstood the test of carefully distinguishing between initial and subsequent incumbent defeats but also should be revised to reflect the fact that the typical length of a change episode extends well beyond a single election--involving repeated incumbent defeats in as many as four successive elections. Moreover, it was demonstrated that once a district suffers an episode of electoral instability, the probability of incumbent defeat in ensuing elections is significantly reduced.

One of the intriguing aspects of Figure 2 which was not reported in the Criswell/Mitchell article was the sawtooth nature of the graph of the elections following an incumbent defeat and those following a no defeat election. Interested in explaining more fully the application of critical elections theory to democratic control of American School Districts attention was directed in understanding the meaning of the sawtooth character found in the Criswell/Mitchell article. The primary purpose of this additional analysis of earlier gathered data which is to be repeated here is to focus on the impact election outcomes in one election have on subsequent elections. More specifically the probability of any member of a cohort group suffering an incumbent defeat is affected by whether or not a member of that cohort defeated an incumbent in a prior election.

III. Hypothesis and Definition of Variables

The working hypothesis for this study is that if a member of a cohort is a successful insurgent the probability that other members of that cohort will suffer an incumbent defeat is reduced and the probability that a member of the other cohort will be defeated is increased. To recapitulate the problem, the independent variable of this study is the successful insurgency of members of a cohort. The dependent variable for this study becomes the incumbent defeat of other incumbents.

A corollary hypothesis of this study is that if no member of a cohort is a successful insurgent then the probability that a member of that cohort will be defeated is increased and the probability that a member of the other cohort will be defeated is decreased.

IV. Methodology

Election data from the 89 school districts in four Southern California counties from 1956 to 1977 which was reported earlier as comprising the Criswell/Mitchell article was utilized for the sample of this study (see Methodology and Data Analysis section of Criswell/Mitchell Article Reprisal reported earlier in this report).

V. Findings

It can be seen from the regression analysis (Fig. 2) that the outcome of one election has a significant effect on the outcome of both immediately following elections and those occurring some years later. A regression line for the no defeat elections and linear defeat elections was calculated using the mean scores. For the no defeat elections the regression line was derived from the following:

Parameter	Estimate	T for HO: Parameter = 0	PR > |T|	Std. Error of Estimate
Intercept	0.2306	12.36	0.0001	0.019
Year	0.0143	3.35	0.0008	0.004
Cohort	0.01751	0.54	0.5873	0.032
Year by Cohort	-0.0030	-0.42	0.6746	0.007

The incumbent defeat regression line shown in Figure 2 is calculated on the basis of the following data:

Parameter	Estimate	T for HO: Parameter = 0	PR > |T|	Std. Error of Estimate
Intercept	0.3168	7.61	0.0001	0.0416
Year	-0.0058	-0.66	0.5113	0.0088
Cohort	0.1109	2.17	0.0298	0.0510
Year by Cohort	-0.0167	-1.54	0.1247	0.0109

The regression line for election outcomes following initial elections involving no - incumbent defeat is linear and significant for the years this regression line shows that the probability of suffering an incumbent defeat following an election in which no incumbent defeat occurred is at its lowest in the very next election and rises fairly steadily at the rate of approximately 1.4% per election period (or .7% per year)) over the entire 20-year range of our data. The regression line for election outcome following initial elections involving incumbent defeat is not significant for the years when a linear line is constructed (The earlier Criswell, Mitchell article presented a significant curvilinar regression line). The two regression lines cross, however, following the third subsequent election--indicating that the preparation of incumbent defeats following

an incumbent defeat is actually lower for elections after the third one. In other words, having an incumbent defeat increases the probability of an incumbent defeat in the next three elections and suppresses the probability in elections eight or more years later.

In the attempt to view the presence, if any, of a cohort effect the data was subjected to an analysis of covariance subsequently, a planned contrast analysis was utilized to further the explanation of the presence of a possible cohort effect. Table 7 presents the results from the analysis of covariance and planned contrast analysis for incumbent defeats following a no incumbent defeat.

TABLE 7

Analysis of Covariance and Planned Contrast Analysis for Incumbent Defeats following a no Incumbent Defeat

Source	Sum of Squares	df	Mean Square	F	P
Model	3.2220	3	1.074	5.26	0.0014
Error	681.1918	3335	0.204		
Corrected Total	684.4138	3338			

Source	Sum of Squares for effect	df	F	P
Year	2.6359	1	12.90	0.0003
Cohort	0.0601	1	0.29	0.5873
Year by Cohort	0.0360	1	0.18	0.6746

Table 8 provides a look at the results of the analysis of covariance and planned contrast analysis for incumbent defeats following an incumbent defeat.

TABLE 8

Analysis of Covariance and Planned Contrast Analysis for Incumbent Defeats following an Incumbent Defeat

Source	Sum of Squares	df	Mean Square	F	P
Model	3.596	3	1.1988	5.55	0.001
Error	304.174	1409	0.2159		
Corrected Total	307.770	1412			

Source	Sum of Squares for effect	df	F	P
Year	1.4515	1	6.72	0.0096
Cohort	1.0207	1	4.73	0.0298
Year by Cohort	0.5094	1	2.36	0.1247

The findings drawn from the analysis of covariance and planned contrast analysis lend support to our hypothesis in that it is shown that the years and cohort are significant for the data derived following an incumbent defeat. However, although years is found to be significant for the no defeat data the cohort does not add significance to years. From these findings support is given to our initial hypothesis that if a member of a cohort is a successful insurgent the probability that other members of that cohort will suffer an incumbent defeat is reduced and the probability that a member of the other cohort will be defeated is increased. However, our corollary hypothesis is rejected that if no member of a cohort is a

successful insurgent then the probability that a member of that cohort will be defeated is increased and the probability that a member of the other cohort will be defeated is decreased.

The implications of our findings have both theoretical as well as practical significance. Theoretically, our findings suggest that citizens do get targeted on a group when they have been successful with one cohort and then they turn their attention to other members of that cohort. Thus, dissatisfaction is targeted on one cohort. These effects tend to last 8 to 10 years as indicated in our Figure 2. Change should not be viewed as being instantaneous which was also reported in the Criswell/Mitchell article.[18]

Practically our findings suggest that voters tend to target much of their attention on the reorganization of board personnel when they feel discontentment. The practical implications of these findings suggest that all of the major actors in the school district need to be aware of the political climate within the district. The findings clearly support that citizens do play an active part in the decision making process when the school board becomes a closed system and do view board members as cohort groups. As found in an earlier research[19] as well as current research, school districts' politics are episodic in nature which suggests that the fate of a school manager losing his/her political support could be characterized by this episodic sequence of events.

NOTES

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[3]e.g. see
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[4]Iannaccone/Lutz, loc. cit.

[5]V. O. Key, Jr., loc. cit.

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[6]Richard Thorsted, loc. cit.

[7]Larry Criswell, loc. cit.

[8]L. Criswell and D. Mitchell. "Episodic Instability in School District Elections," Urban Education, July, 1980.

[9]Ibid.

[10]Ibid.

[11]William L. Hays, Statistics, New York: Holt, Rinehard and Winston, 1963, pp. 628-630.

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[15]G. Keppell, Design and Analysis: A Researcher's Handbook. Englewood Cliffs, New Jersey: Prentice-Hall, 1973.

[16]Minar, loc. cit.

[17]Slightly different values are reported from earlier work which is due to the use of a different computer program.

[18]Criswell and Mitchell, loc. cit.

[19]Ibid.